

CLAIMS

1. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, wherein

the bonding target includes an insertion hole for inserting the heating target, and

the insertion hole of the bonding target includes a notch formed on an inner edge of the insertion hole on a side facing the resonator.

2. The ultrasonic welding structure according to claim 1, wherein

15 the notch of the insertion hole serves as an acceptance unit that accepts the heating target in a molten state.

20 3. The ultrasonic welding structure according to claim 1, wherein

the notch of the insertion hole serves as a stress relaxing unit that relaxes a stress generated within the bonding target due to a contact with the inner edge of the insertion hole.

25 4. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, wherein

a surface of the resonator on which the resonator contacts with the heating target is formed in a substantially flat shape, and

the heating target includes a resonator connecting unit that is formed to protrude toward the resonator.

5. An ultrasonic welding structure for bonding a columnar
5 heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, wherein

10 the resonator includes a protruding portion that protrudes from a bottom of the resonator toward the heating target, and

the protruding portion of the resonator is formed in a substantially semispherical or conical shape.

15 6. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, wherein

20 the resonator includes a protruding portion that protrudes from a bottom of the resonator toward the heating target, and

25 an inclined surface is formed on the resonator from the bottom of the resonator to a base of the protruding portion.

7. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, wherein

the resonator includes a protruding portion that protrudes from a bottom of the resonator toward the heating

target, and

the heating target includes a resonator acceptance unit formed at least in a concave shape with relative to the resonator.

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8. The ultrasonic welding structure according to claim 7, wherein

the protruding portion of the resonator is formed in a substantially semispherical shape, and

10 the resonator acceptance unit of the heating target is formed in a substantially conical shape with a diameter large enough to include the protruding portion formed in the substantially semispherical shape.

15 9. The ultrasonic welding structure according to claim 7, wherein

the resonator acceptance unit is an elongated hole formed along a direction of pressing the resonator.

20 10. The ultrasonic welding structure according to claim 7, wherein

the resonator acceptance unit is a penetrating hole formed along a direction of pressing the resonator to reach a bottom of the heating target.

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11. The ultrasonic welding structure according to any one of claims 7 to 10, wherein

a notch is provided in an upper edge of the resonator acceptance unit.

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12. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating

target and applying a high frequency vibration from the resonator to the heating target, wherein

the heating target includes

5 a large-diameter portion located on a side of a base of the heating target; and

a small-diameter portion located on a side of the resonator relative to the large-diameter portion, with a smaller diameter than a diameter of the large-diameter portion.

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13. The ultrasonic welding structure according to claim 12, wherein

the bonding target includes an insertion hole for inserting the heating target, and

15 a boundary between the large-diameter portion and the small-diameter portion of the heating target is arranged downward of an upper surface of the bonding target in a state in which the heating target is inserted into the insertion hole.

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14. An ultrasonic welding structure for bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the 25 resonator to the heating target, wherein

the resonator includes

a protruding portion that protrudes from a bottom of the resonator toward the heating target, the protruding portion being formed in a substantially semispherical or 30 conical shape; and

an inclined surface formed from the bottom of the resonator to a base of the protruding portion, and

the heating target includes a resonator acceptance

unit in a shape of a penetrating hole formed along a direction of pressing the resonator to reach a bottom of the heating target.

- 5 15. An ultrasonic welding method of bonding a columnar heating target formed with a resin to a predetermined bonding target by pressing a resonator against the heating target and applying a high frequency vibration from the resonator to the heating target, the ultrasonic welding
10 method comprising:

preheating a contact portion of the resonator on which the resonator contacts with the heating target; and
heating including pressing the contact portion heated at the preheating against the heating target to apply a
15 high frequency vibration to the heating target.